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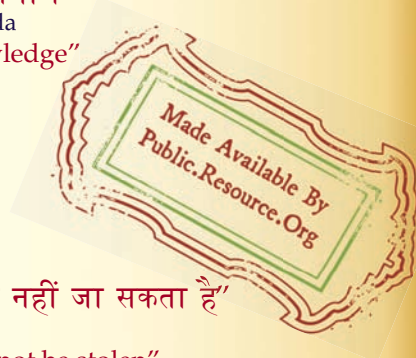
IS 10322-5-5 (1987): Luminaires, Part 5: Particular requirements, Section 5: Flood light (superseding IS:1947)  
[ETD 24: Illumination Engineering and Luminaries]



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**IS : 10322 ( Part 5/Sec 5 ) - 1987**

**( Superseding IS : 1947-1980 )**

**( Reaffirmed 1995 )**

*Indian Standard*

# **SPECIFICATION FOR LUMINAIRES**

## **PART 5 PARTICULAR REQUIREMENTS**

### **Section 5 Flood-Lights**

**( First Reprint AUGUST 1998 )**

**UDC 628.94.064 : 621.32**

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**MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG**  
**NEW DELHI 110002**

# *Indian Standard*

## SPECIFICATION FOR LUMINAIRES

### PART 5 PARTICULAR REQUIREMENTS

#### Section 5 Flood-Lights

#### 0. FOREWORD

**0.1** This Indian Standard ( Part 5/Sec 5 ) was adopted by the Bureau of Indian Standards on 28 October 1987 after the draft finalized by the Illuminating Engineering and Luminaires Sectional Committee had been approved by the Electrotechnical Division Council.

**0.2** The indigenous manufacture of flood-lights has developed with the increasing trend of flood-lighting for illumination of buildings, sports grounds, yards, etc. In order to regulate the manufacture of flood-lights so that they are able to withstand the open air conditions prevailing in the country while performing their functions, an Indian Standard on flood-lights ( IS : 1947 ) was first published in 1961 which covered filament lamps only. Subsequently, this standard was revised in 1980 to cover the flood-lights fitted with tubular fluorescent and other discharge lamps in addition to the filament lamps.

**0.3** In order to take into account the developments in the field of illumination engineering, this standard ( Part 5/Sec 5 ) has been prepared as a part of a new series of Indian standards on luminaires. This standard, therefore, supersedes IS : 1947-1980\* published earlier on this subject.

**0.4** This standard ( Part 5/Sec 5 ) is one among the series of Indian standards which deals with luminaires. This series consists of the following parts:

- Part 1 General requirements
- Part 2 Constructional requirements
- Part 3 Screw and screwless terminals
- Part 4 Methods of tests
- Part 5 Particular requirements

**0.5** In general, Parts 1, 2, 3 and 4 of this stan-

dard cover safety requirements for luminaires. The object of these parts is to provide a set of requirements and tests which are considered to be generally applicable to most types of luminaires and which can be called up as required by the detailed specifications under Part 5. Parts 1, 2, 3 and 4 are thus not to be regarded as a specifications by itself for any type of luminaire, and its provisions apply only to particular types of luminaires to the extent determined by the appropriate section of Part 5.

**0.6** The sections of Part 5, in making reference to any other parts of the standard, specify the extent to which that section is applicable and the order in which the tests are to be performed; they also include additional requirements as necessary. The order in which the clauses in Parts 1, 2, 3 and 4 are numbered, therefore, has no particular significance as the order in which their provisions apply is determined for each type of luminaire or the group of luminaires by the appropriate section of Part 5. All sections of Part 5 are self-contained and, therefore, do not contain references to other sections of Part 5.

**0.7** In the preparation of this standard, assistance has been derived from IEC Publication: 598-2-5 'Part 2: Particular requirements Section 5 Flood-lights', issued by the International Electrotechnical Commission.

**0.8** For the purpose of deciding whether a particular requirement of the standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

\*Specification for flood-lights ( *first revision* ).

\*Rules for rounding off numerical values ( *revised* ).

#### 1. SCOPE

**1.1** This standard ( Part 5/Sec 5 ) specifies requirements for flood-lights for use with tungsten filament, tubular fluorescent and other discharge lamps on supply voltages not exceeding 1 000 V.

It is to be read in conjunction with Parts 1 to 4 of this standard to which the reference is made

#### 2. DEFINITIONS

**2.0** For the purposes of this standard, the definitions of Part 1 of this standard apply together

with the following definitions:

**2.1 Flood-lighting** — The lighting by projection of the whole of a scene or subject to an illumination significantly greater than that of its surroundings.

NOTE — The difference in illumination between the subject and its surroundings may, alternatively, be achieved by colour.

**2.2 Flood-light** — A luminaire for flood-lighting.

NOTE — A flood-light may be for either exterior or interior use or for both.

### 3. GENERAL TEST REQUIREMENTS

**3.1** The provisions of 3 of Part 1 of this standard shall apply. The tests shall be carried out in the order listed in this standard.

### 4. CLASSIFICATION OF LUMINAIRES

**4.1** Flood-lights shall be classified in accordance with the provisions of 5 of Part 1 of this standard.

### 5. MARKING

**5.1** The provisions of 6 of Part 1 of this standard shall apply.

**5.2** Where necessary to ensure proper use and maintenance, the following additional particulars shall also be marked on the flood-light or otherwise made available to the purchaser:

- a) Operating position, if not universal;
- b) Weight and overall dimensions of the floodlight;
- c) Maximum projected area of the floodlight;
- d) Range of mounting heights; and
- e) Suitability for use indoors.

**5.3** The luminaires may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

### 6. CONSTRUCTION

**6.0** The provisions of Part 2 of this standard shall apply together with the requirements of 6.1 to 6.6.

**6.1** Floodlights for use outdoors shall have protection against the ingress of moisture at least equivalent to IP  $\times$  3.

**6.2** Lampholder brackets and lamp supports, where used, shall withstand normal usage throughout the life of the floodlight. They shall accept and retain lamps which are within the

dimensional tolerances stated in the appropriate Indian standards where applicable, and locate the lamp or lamps in the designed relationship to the optical control devices in the floodlight.

**6.3** When provision is made for alternative sizes of lamps or light centre positions, the adjusting means shall be positively and firmly retained in the selected position.

**6.4** Refractors, reflectors or any other light controlling components shall be so marked or constructed that they can be fitted or replaced only in the correct relationship to the light source.

**6.5** The means for attaching the floodlight to its support shall be appropriate to the weight of the floodlight.

For flood-lights for use above ground level outdoors, the mounting arrangement shall be such as to make the flood-light connection withstand wind speeds of 150 km/h on the projected surface of the floodlight assembly without undue deflection.

Fixings which carry the weight of the floodlight and internal accessories shall be provided with appropriate means to prevent the dislodging of any part of the floodlight by vibration, either in service or during maintenance.

Parts of flood-lights for mounting heights 3 m or higher which are fixed other than with at least two devices, for example, screws or equivalent means of sufficient strength, shall have such extra protection as to prevent those parts falling and endangering persons, animals and surroundings, if a fixing device fails under normal conditions.

Compliance shall be checked by inspection and, for flood-lights for use above ground level outdoors, by the additional test of 6.5.1.

**6.5.1** The flood-light is mounted with its largest projected area as viewed in elevation lying in the horizontal plane, and with the means of attachment secured in accordance with the manufacturer's recommendations.

For flood-lights for use above ground level outdoors, a constant evenly distributed load is applied for 10 min on the floodlight using sand bags providing 2.4 kN m<sup>2</sup> of floodlight projected area. The flood-light is then turned 180°, in the vertical plane, about the point of attachment and the test is repeated.

During the test, there shall be no failure or movement about the point of attachment, and after either part of this test there shall not be permanent set exceeding 1°.

**6.6** Where means for angular adjustment are provided, there shall be provision for positive locking after any such adjustments have been effected.

**6.7** Flood-lights for use outdoors shall be resistant to vibrations which may occur during normal use.

## 7. CREEPAGE DISTANCES AND CLEARANCES

7.1 The provisions given in 4 of Part 4 of this standard shall apply.

## 8. PROVISION FOR EARTHING

8.1 The provisions given in 2.0 of Part 2 of this standard shall apply.

## 9. TERMINALS

9.1 The provisions given in Part 2 of this standard shall apply.

## 10. EXTERNAL AND INTERNAL WIRING

10.1 The provisions given in 19 of Part 2 of this standard shall apply.

## 11. PROTECTION AGAINST ELECTRIC SHOCK

11.1 The provisions given in 21 of Part 2 of this standard shall apply.

## 12. PHOTOMETRIC REQUIREMENTS

12.1 The manufacturer or supplier shall provide the following data relating to performance of the luminaires:

- a) Luminous intensity curves for both vertical and horizontal planes,
- b) Beam spread on the basis of  $I > 0.5 I_{\max}$  and  $I > 0.1 I_{\max}$  for both vertical and horizontal planes,
- c) Maximum intensity, and
- d) Total light output ratio.

12.1.1 The manufacturer or supplier shall provide the following data relating to performance of the luminaire on request:

- a) Relative isolux diagram for at least  $0^\circ$  aiming angle,
- b) Relative isocandela diagram, and
- c) Data on zonal flux.

12.2 **Light Controlling Components** — The attachment of reflectors or any other light controlling components shall be such that they can only be fitted or replaced in the correct relationship to their light source.

## 13. TESTS

### 13.1 Classification of Tests

13.1.1 *Type Tests* — The following shall constitute the type tests:

- a) Visual examination ( see 13.2 ),
- b) Mechanical strength test ( see 13.3 ),
- c) Endurance tests and thermal tests ( see 13.4 ),
- d) Resistance to dust and moisture ( see 13.5 ),

- e) Insulation resistance and electric strength ( see 13.6 ),
- f) Resistance to heat, fire and tracking ( see 13.7 ), and
- g) Photometric test ( see 13.8 ).

13.1.1.1 *Criterion of acceptance* — Samples for type testing shall be mutually agreed between the purchaser and the supplier. These samples shall be submitted for testing together with relevant data. The testing authority shall issue a type approval certificate if the luminaires comply with the requirements given in 13.1.1.

In case of failure in any one type test, the testing authority may call for fresh samples not exceeding twice the number of original samples and subject them to test in which failure occurred. If in repeat tests, no failure occurs, the tests shall be considered to have been satisfied.

13.1.2 *Acceptance Tests* — The following shall constitute the acceptance tests:

- a) Visual examination ( see 13.2 ),
- b) Resistance to dust and moisture ( see 13.5 ),
- c) Insulation resistance and electric strength ( see 13.7 ), and
- d) Photometric test ( see 13.8 ).

13.1.2.1 The number of samples for acceptance shall be as agreed upon between the purchaser and the supplier. However, a recommended plan of sampling is given in Appendix A.

13.1.3 *Routine Tests* — The following shall constitute the routine tests:

- a) Visual examination ( see 13.2 ), and
- b) Insulation resistance and electric strength ( see 13.6 ).

13.2 **Visual Examination** — The luminaires shall be examined visually for external finish, workmanship and electrical connections.

13.3 **Mechanical Strength Test** — The provisions of 5 of Part 4 of this standard shall apply.

13.4 **Endurance Test and Thermal Test** — The provisions of 6 of Part 4 of this standard shall apply.

13.5 **Resistance to Dust and Moisture** — The provisions of 2 of Part 4 of this standard shall apply.

13.6 **Insulation Resistance and Electric Strength Test** — The provisions of 3 of Part 4 of this standard shall apply.

13.7 **Resistance to Heat, Fire and Tracking** — The provision of 7 of Part 4 of this standard shall apply.

**13.8 Photometric Test** — The photometric performance shall be determined by a suitable photometric tests as agreed between the purchaser and the supplier. A recommended photometric test for flood-lights fitted with tungsten filament lamps is given in Appendix B.

NOTE — A separate standard on method of

photometry for flood-lights is under preparation. In the absence of a recommended method, photometric test may be carried out as per mutual agreement between the purchaser and the supplier.

**13.8.1** Flood-lights fitted with tungsten filament lamps shall meet the photometric requirements specified in 12.

## APPENDIX A

( Clause 13.1.2.1 )

### SAMPLING PLAN FOR ACCEPTANCE TESTS

#### A-1. LOT

**A-1.1** In any consignment, all luminaires of same size and manufactured from the same material under similar conditions of production shall be grouped together to constitute a lot.

#### A-2. SCALE OF SAMPLING

**A-2.1** For judging the conformity of a lot to the requirements of the acceptance tests, sampling shall be done for each lot separately. For this purpose, the number of luminaires to be selected at random from each lot shall depend upon the size of the lot and shall be in accordance with Table 1.

**TABLE 1 SAMPLE SIZE AND ACCEPTANCE NUMBER**

Lot Size	FOR VISUAL EXAMINATION, INSULATION RESISTANCE AND ELECTRIC STRENGTH		FOR OTHER ACCEP- TANCE TESTS, SAMPLE SIZE
	Sample Size	Acceptance Number	
(1)	(2)	(3)	(4)
Up to 150	8	0	2
151 „ 300	13	0	2
301 „ 500	20	1	3
501 „ 1 000	32	2	5
1 001 „ 3 000	50	3	8
3 001 and above	80	5	8

**A-2.2** Those luminaires shall be selected at random from the lot. In order to ensure the randomness of selection, procedures given in IS : 4905-1968\* may be followed.

#### A-3. NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

**A-3.1** The luminaires selected in accordance with col 1 and 2 of Table 1 shall be subjected to visual examination, insulation resistance test and electric strength test. A luminaire failing to satisfy any of these acceptance tests shall be termed as defective. The lot shall be considered as conforming to the requirements of these acceptance tests if the number of defectives is less than or equal to the corresponding acceptance number given in col 3 of Table 1, otherwise not.

**A-3.2** A lot which is found as conforming to the above requirements shall then be tested for the remaining acceptance tests, namely, resistance to dust and moisture and photometric tests. For this purpose, the sample size shall be selected in accordance with col 4 of Table 1. The lot shall be considered as conforming to the requirements of these acceptance tests if there are no failures.

**A-3.3** The lot shall be considered as conforming to the requirements of acceptance tests if **A-3.1** and **A-3.2** are satisfied.

\*Methods for random sampling.

## APPENDIX B

( Clause 13.8 )

### PHOTOMETRIC TEST FOR FLOOD-LIGHTS

#### B-1. GENERAL

**B-1.1** The photometric measurements described in this standard relate to determining the luminous intensities in the projected beam which may

be presented as a luminous intensity distribution diagram, iso-candela diagram or in tabulated form suitable for use in computer calculation. These intensities are deduced from illuminance measurement.



**B-1.2 Half Peak Side Angle** — The angle between the direction of maximum luminous intensity and the direction in which the floodlight has a luminous intensity of 50 percent of the maximum measured in the specific half-plane.

**B-1.2.1 Inner Beam of Flood-light** — The solid angle containing all directions of luminous intensities greater than or equal to 50 percent of maximum intensity.

**Outer Beam of Flood-light** — The solid angle containing all directions of luminous intensities greater than or equal to 10 percent of maximum intensity.

**Light Output Ratio** — Ratio of the light output of a flood-light, measured under specified practical conditions, to the sum of the individual light output of the lamps operating outside the flood-light under specified conditions.

## B-2. EQUIPMENT

**B-2.1 Photometric Equipment** — The photometric equipment shall be calibrated throughout the entire usable scale and the individual readings shall be reproducible within a tolerance of  $\pm 2$  percent.

**B-2.1.1** Provision should be made for correct optical positioning of flood-lights in relation to the photometric axis and for candle-power measurements at any angular setting in both horizontal and vertical directions. Stray light should be entirely avoided in the test set up.

**B-2.2 Photometric Integrator** — To average out minor variations in the beam, an integrating device should be used which will integrate the illumination over one square degree ( $53.19 \times 53.19$  cm for 30 m testing range) over a circular area of 53.19 cm diameter at distance of 30 m.

## B-3. PROCEDURE

**B-3.1 Test Distance** — A minimum range of 30 m is required.

**B-3.2 Mounting** — The flood-light shall be mounted on a goniometer to allow positioning to definite angles about both horizontal and vertical axes. The centre of the aperture shall be at the intersection of the horizontal and vertical axes.

### B-3.3 Test Procedure

**B-3.3.1** The flood-light shall be adjusted in ten equal angular steps in each of ten equally spaced vertical or horizontal planes. The spacing should be planned so that the maximum beam candle-power is approximately centred and so far that 10 percent of the maximum is just within the area covered. This method of taking candle-power is to traverse the beam with such angular

spacings as to give approximately 100 reading points uniformly spaced throughout the beam, the beam limit being as given in B-1.2. By interpolating between these readings, a candle-power distribution diagram shall be plotted on rectangular coordinates.

**B-3.3.2** The relative candle-power readings of the test lamp alone and of the test lamp and flood-light combination should be made with the test lamp operating under identical electrical conditions in both tests. The average candle power of the test lamp shall be measured at each angular setting by rotating the lamp or by taking the average candle-power values in not less than ten planes spaced equally around the lamp. The relative lumen output of the test lamp alone is obtained by the usual summation process using zonal lumen constants. All candle-power readings should be corrected in proportion to the rated lumens of the test lamp by multiplying by the ratio of rated lamp lumens to relative lamp lumens.

**B-3.3.3** If required, for measurement of stray light, the outside of the beam may also be divided into suitable rectangular areas of larger dimensions than the spacing within the beam.

## B-4. EVALUATION OF TEST RESULTS

**B-4.1** The evaluation of test results shall be done in the following order:

- a) Average the corresponding candle-power values in the right and left sides of the beam;
- b) Plot the change of candle-power across each of the horizontal traverses in the beam and work out from this data the isocandela and beam limit curves ;
- c) Compute the lumens in each individual test area or rectangle using the proper lumen constants;
- d) Sum up the lumens of each individual test area making suitable allowance where a test area lies partially within the beam and partially within the stray light zone;
- e) Compute the stray light, if required;
- f) Compute the beam factor of the flood-light by dividing beam flux by manufacturers' rated lumen output of the test lamp; and
- g) Compute the overall efficiency, if required, by dividing total lumen output ( sum of beam flux and stray light lumens ) by manufacturer's rated lumen output of the test lamp.

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#### Amendments Issued Since Publication

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**AMENDMENT NO. 1 JANUARY 1995  
TO  
IS 10322 ( Part 5/Sec 5 ) : 1987 SPECIFICATION FOR  
LUMINAIRES**

**PART 5 PARTICULAR REQUIREMENTS**

**Section 5 Flood Lights**

*( Page 4, clause 13.8, Note ) — Delete.*

*( Page 4, clause 13.8.1 ) — Insert the following new subclause after 13.8.1:*

**‘13.8.2 The photometric performance shall be determined by the test method given in IS 13383 (Part 3) : 1992 Photometry of luminaires — Method of measurement : Part 3 Luminaires for flood lighting.’**

**(ETD 24)**